RUBSTRIP COEXTRUSION FOR VESSELS

Related Applications

This application is based on prior copending provisional patent application Serial No. 60/442,724, filed on January 23, 2003, the benefit of the filing date of which is hereby claimed under 35 U.S.C. § 119(e).

Field of the Invention

The invention relates to a rub rail for nautical vessels, and more specifically to a rub rail that includes a base that is attached to the vessel, and a decorative insert disposed in the base, the decorative insert including a stainless steel portion and a plastic portion.

Background of the Invention

A rub rail is typically affixed to the hull of a boat where the deck is attached to and overlaps the upper edge of the hull. The rub rail overlies and protects the seam of the hull at that point. Rub rails function to protect the hull when a nautical vessel contacts another object, such as the sides of a wharf when the nautical vessel is docking.

Vinyl and plastic provide suitable materials for fabricating rub rails, with respect to durability and cost, however, rub rails made solely of such materials are not very decorative. Prior art rub rails have included metallic films, and such films do add an element of style to rub rails. One example of such a solution is provided in U.S. Patent No. 6,349,662 (Limansky). However, such metallic films are not very durable, and thus do not provide a long lasting solution.

Stainless steel is quite durable, and has been used as decorative trim for rub rails. Prior art rub rails including decorative metal trim have employed the same fastener to attach the metal trim to the base of the rub rail that is used to

fasten the rub rail base to the hull of a vessel. Thus the metal trim has a plurality of openings in the trim. Particularly in nautical environments, such openings, even when substantially sealed by a fastener, are undesirable, as moisture is able to pass through such openings and collect within the rub rail, beneath the metal trim. Such moisture can lead to corrosion and damage, not only to the rub rail, but also potentially to the vessel hull itself.

It should also be noted that besides the material expense of the rub rail itself, installation of rub rails can be quite labor intensive. Prior art rub rails in which the metal decorative trim itself must be fastened to the hull of a vessel is quite labor intensive to install. Such metal trim is provided in sectional lengths, which must be cut to fit a particular vessel. The lengths are normally provided in much smaller lengths than required to protect the entire perimeter of a vessel, thus a plurality of seams between different sections of trim are present. Such seams are not only unaesthetic; they also offer the potential for moisture to work past such seams.

It would be desirable to provide a corrosion resistant rub rail that incorporates stainless steel decorative trim, that can be easily and inexpensively manufactured, and which can easily be applied to vessels.

Summary of the Invention

One aspect of the invention is directed to a rub rail for use on a nautical vessel. The rub rail includes two primary components, an elongate base configured to be attached to a nautical vessel, and a decorative trim insert that is affixed to the base. The elongate base includes a plurality of base flanges that engage flanges on the decorative trim insert. In at least one embodiment, the underside of the base forms a generally "L" shaped surface that is designed to overlie the seam between the deck and the hull of a nautical vessel when the base is attached to the hull of the nautical vessel. The base can be attached to the nautical vessel using any appropriate conventional method of attachment, including adhesives and threaded fasteners. Preferably, the base is provided in coils, for example, and may be 75 feet in length or more. This enables the base to be installed on a nautical vessel using only a single seam, if desired. For nautical

vessels having hulls with gentle curves, the base can be installed using a single seam.

Once the base is installed on the nautical vessel, the decorative trim insert can be attached to the base. The decorative trim insert includes a polymeric trim strip and a decorative metal trim layer. When the insert is secured to the base, the decorative metal trim layer is disposed on an outer surface of the rub rail. The insert preferably includes flanges that cooperate with the base flanges to secure the insert to the base. Significantly, the decorative trim insert is formed using a co-extrusion process in which the decorative metal trim layer is co-extruded with the polymeric trim strip. Preferably, the insert is configured such that outwardly extending lips on each edge of the polymeric trim strip cover the longitudinal edges of the decorative metal trim layer, to reduce the chance that water will intrude under the decorative metal trim layer and cause corrosion of any metal fasteners that are used. Preferably, the decorative metal trim is stainless steel having characteristics chosen to resist corrosion.

In at least one embodiment, the base includes a longitudinally extending channel, and first and second flanges extending generally upwardly on opposite sides of the channel. In at least one embodiment, the base and insert are configured such that when the insert is secured to the base, the first and second flanges of the base do not cover any portion of the decorative metal trim layer. Also, the base and insert are preferably configured such that when the insert is secured to the base, an upper surface of the insert covers each longitudinally extending joint where the insert engages the base. In at least one embodiment the insert includes flanges that extend upwardly to engage an inner surface of the base flanges. In another embodiment, the insert includes flanges that extend downwardly, with lips that extend laterally outward to engage inner surfaces of the base flanges.

Another aspect of the invention is directed to a method for installing the rub rail discussed above on a nautical vessel. A coil of the rub rail base and the rub rail insert are provided. The base is attached to the vessel, using adhesives, threaded fasteners, or a combination thereof as desired, or other appropriate

fasteners. If the coil of base material is too rigid to readily conform to the hull of the nautical vessel, a heat gun can be used to heat the base material and temporarily increase its flexibility. Preferably, the coil provided is sufficiently long such that only a single seam is required to attach the base to the vessel. The seam is optimally positioned at the rear of the vessel. Once the base is attached, the insert is secured to the base using flanges formed into the base and insert material. Again, if the insert material is too rigid to readily conform to the base, a heat gun can be used to temporarily increase the flexibility of the rub rail insert. If desired, the rub rail may be installed with only a single seam of the rub rail insert. Preferably, any seams in the base and insert do not overlap, to reduce the likelihood that water passing an insert seam might then pass through a base seam.

Brief Description of the Drawing Figures

The foregoing aspects and many of the attendant advantages of this invention will become more readily appreciated as the same becomes better understood by reference to the following detailed description, when taken in conjunction with the accompanying drawings, wherein:

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FIGURE 1 is a cross-sectional view of a rub rail in accord with the present invention;

FIGURE 2A is an end view of an insert portion of the rub rail of FIGURE 1, in which the stainless steel decorative trim has been co-extruded with a plastic support;

FIGURE 2B is an end view of a base portion of the rub rail of FIGURE 1;

FIGURE 3 is a schematic front-end view of a nautical vessel onto which the rub rail of FIGURE 1 has been attached;

FIGURE 4 is an isometric view of a portion of the rub rail of FIGURE 1;

FIGURE 5 is a schematic view of a co-extrusion process for fabricating the insert for the rub rail of FIGURE 1, in accord with the present invention; and

FIGURES 6A-6B are cross-sectional views of alternative embodiments of rub rails including co-extruded inserts in accord with the present invention.

Description of the Preferred Embodiment

The present invention is a rub rail including both a base portion and an insert portion. The base portion includes a longitudinally extending recess or groove, into which the insert is secured. The base portion preferably includes a plurality of spaced-apart orifices along the bottom surface of the recess to enable the base portion to be attached to the hull of a nautical vessel with threaded fasteners. The insert, preferably made of a polyvinyl chloride plastic, snaps into the groove and covers the heads of the fasteners, preventing moisture from reaching the fasteners. The insert is held in place by the edges of the groove. The outer face of the insert includes a decorative trim, preferably formed of stain less steel. The decorative trim is bright and shiny, and provides an aesthetically pleasing appearance to the rub rail. The trim is crosshead extruded with the plastic portion of the insert. The extrusion process seals the plastic portion of the insert around the longitudinally extending edges of the stainless steel strip, preventing water from intruding behind the strip, which might eventually cause corrosion.

FIGURE 1 is a cross-sectional view of a rub rail 10 in accord with the present invention. As is clearly shown in FIGURES 2A and 2B, rub rail 10 is a two-part system, including a base 12, and an insert 14. FIGURE 1 shows base 12 and insert 14 coupled together to form rub rail 10, while FIGURE 2A is an end view of insert 14, and FIGURE 2B is an end view of base 12.

Base 12 is preferably fabricated from a vinyl material, though other polymeric materials can be beneficially employed. Base 12 includes an elongate flange 28, and a pair of generally arcuate flanges 30, which function as the sidewalls of a channel 38. The bottom of channel 38 includes a fastener support 20. Fastener support 20 can extend along substantially the entire longitudinal length of base 12, or it can be formed into base 12 at intervals only where fasteners will be employed. If such intervals are provided, then the spacing of the intervals should be selected so as to ensure sufficient fasteners can be

employed to adequately fasten base 12 to the hull of a nautical vessel. Fastener supports 20 preferably include orifices 22 into which such fasteners can be inserted, to attach base 12 to a nautical vessel. Preferably threaded fasteners (not shown) will be employed. Note that when rub rail 10 is fastened to a nautical vessel, a face 24 (see FIGURE 1) of base 12 preferably is in contact with an upper portion of the hull of the nautical vessel, while a face 26 (see FIGURE 1) of base 12 is in contact with a deck of the nautical vessel. While base 12 does not have a specified length, it anticipated that base 12 will be provided in rolls, such that the required length can be cut as necessary. Providing base 12 in lengths that exceed the required application enable fewer seams to be made when attaching the base to a vessel. If the base if of sufficient length, and the contour of the vessel allows, it is possible to attach base 12 to the entire perimeter of a vessel using only a single seam. It is anticipated that 50-75 foot length coils will be sufficient for many applications.

While base 12 could be formed of many different materials, polymers are not only inexpensive; they can be fabricated using well-known extrusion processes into a desired length. Base 12 could be formed in a mold; however molding 75-foot sections is impractical. The ability of the material base 12 is fabricated from to be extruded enables the desired long lengths to be achieved. Materials that cannot be readily extruded, but can be molded, can be employed for base 12; however such materials would not be able to be provided in lengths sufficient to be applied to the entire perimeter of a vessel with only minimal seams. A polyvinyl chloride plastic material can be beneficially employed for base 12. Such a material can be extruded, enabling the desired lengths to be achieved. A rigid polyvinyl chloride material (often referred to as rigid vinyl) is preferred for the base, as the rigid material is quite durable. While such rigid vinyl is not generally thought of as being sufficiently flexible to be provided in coils (or rolls), it should be noted that immediately after extrusion, the material is sufficiently flexible to be readily coiled. During application, a heat gun can be employed to enable the rigid vinyl to conform to a surface, enabling the base to conform to corners without requiring a seam.

Insert 14 includes a plastic support 16 and a metal trim strip 18. Preferably plastic support 16 is a polyvinyl chloride plastic, and metal trim strip 18 is Type 316 stainless steel. Metal trim strip 18 should be of sufficient thickness that it is durable, and tear resistant. Metal films on plastic substrates can provide an aesthetic appearance, but are generally not durable. When stainless steel is utilized, a preferred thickness is 0.032 inches (approximately 20 gauge). Plastic support 16 can be formed of many different polymeric materials, although polyvinyl chloride plastic having a durometer of about 90 is particularly preferred. The material selected must be capable of extrusion, if the support and trim strip are to be co-extruded. One important aspect of the present invention is co-extruding the metal trim strip with the plastic support to form the insert. As noted above extrusion is preferred, as such a fabrication process lends itself to providing coils of material, so a rub rail can be installed on a nautical vessel with minimal (preferably only one) seams. The co-extrusion of metal trim strip 18 with plastic support 16 is particularly advantageous as the seal between the plastic portion and the metal trim strip is excellent, and water is prevented from intruding behind the strip, which might eventually cause corrosion.

The shape of insert 14 is specifically selected to securely fasten into the channel of base 12 without requiring additional fasteners. Note that when inserted in base 12, flexible flanges 32 of insert 14 conform to the upper surface of arcuate flanges 30 of base 12. Lower flanges 36 of insert 14 engage with surfaces 34 of arcuate flanges 30. Preferably the material of base 12, and specifically arcuate flanges 30, has enough flex to allow insert 14 to be placed into channel 38, while being sufficiently rigid to securely hold insert 14 in channel 38. Thus insert 14 snaps into channel 38, covering the heads of the fasteners, and is held in place by flanges 30. Preferably the shape of insert 14 is such that the stainless steel strip that is crosshead extruded with the plastic portion of the insert has an outer curved face.

Note that because insert 14 is a separate component, if required, a damaged insert 14 could be removed from channel 38, while base 12 remains

attached to the vessel. If base 12 is still in serviceable condition, a new appearing rub rail can be achieved by placing a new insert in the existing base.

FIGURE 3 schematically shows a front-end view of a nautical vessel 40, onto which rub rail 10 has been attached. Note that a portion of rub rail 10 at the port side of nautical vessel 40 is removed, to enable detail relating to the attachment of rub rail 10 to the vessel to be more clearly discerned. In this perspective, it can be seen that surface 26 of base 12 is in contact with a deck 44 of vessel 40, and surface 24 of base 12 is in contact with a hull 42 of vessel 40. Base 12 is secured to hull 42 using fasteners as described above.

FIGURE 4 is an isometric view of rub rail 10. Note that insert 14 has not been fully inserted into channel 38, enabling a portion of base 12 within channel 38 to be viewed. In this particular embodiment, fastener support 20 has been formed into substantially the entire longitudinal length of the base.

FIGURE 5 schematically depicts a co-extrusion system 70 that is applicable to produce insert 14. Extrusion system 70 includes a first extrusion die 72 and coil 74 of metal trim strip 18. The first extrusion die emits a melt stream 76 of a suitable material, such as the 90-durometer flexible poly vinyl chloride material noted above, from an orifice 78 of die 72. Note that melt stream 76 corresponds to plastic support 16 of insert 14. Coil 74 continuously provides the metal trim strip discussed above (preferably stainless steel). However, as will be appreciated by those skilled in the art, other materials are also adaptable to an extrusion process for inserts in accord with the present invention, such as other polymers, rubbers, chrome alloys, etc. Generally melt stream 76 will be opaque, but it should be understood that to achieve a desired decorative effect, melt stream 76 (and the plastic support formed from melt stream 76) could be brightly colored, translucent, or clear. Extrusion die 72 is intended to represent extrusion dies known in the art, wherein a powder, pellet or liquid thermoplastic material is heated to a pliable consistency, and forced out of the die under pressure. While extrusion die 72 and coil 74 are generally separate components, an integrated component capable of simultaneously feeding plastic material and a metal trim of the desired thickness can be employed if available.

A pair of cooperating forming rolls 82 and 84 receive melt stream 76 and metal trim strip 18 to form melt stream 76 and the trim strip into the desired shape as a continuous extrusion 86. As is well understood in the art, the forming rolls are driven in a synchronized relationship, and have a cooperating outer surface configuration that defines an opening (not shown) between the rolls that defines the desired final cross-sectional configuration of continuous extrusion 86. Note that due to the heat and pressure exerted in system 70, the seal between melt stream 76/plastic support 16 and metal trim strip 18 is excellent.

Extrusion 86 is subsequently cooled by conventional cooling apparatus (not shown). After the extrusion 86 has been at least somewhat cooled, a cutter 88 cuts extrusion 86 into desired lengths. Generally, cutter 88 is controlled by a suitable controller 90, as is well known in the art. As discussed above, even if melt stream 76 corresponds to material that is not known for its flexibility, if the extrusions is not fully cooled, the extrusion will likely be sufficiently pliable to be coiled for shipment. While not shown, it should be understood that after extrusion, the insert and base of the present invention are coiled into rolls of product.

FIGURES 6A-6D provide examples of modifications that can be made to the base and insert described above. Preferably, each insert is formed using the crosshead extrusion process discussed above. In FIGURE 6A, showing a rub rail 10a, an insert 14a has been shaped to include an enlarged flange 50, which is to be inserted into a recess 52 formed into base 12a. Base 12a does not include any fastener support, and orifice 22a does not pass through the same thickness of base 12a as do the orifices in base 12.

In rub rail 10b of FIGURE 6B, an insert 14b does not require flexible flanges to conform to an upper surface of a base 12b. Base 12 does not include arcuate flanges 30, but rather flanges 54 are provided to engage corresponding flanges 56 formed into insert 14b. No orifices are provided in base 12b. While such orifices are anticipated to be desired by potential consumers, the polymeric material preferred for fabricating the bases of the present invention are readily penetrable by traditional pointed screws. Thus a consumer can place fastener at locations

determined by the consumer, rather than placing fasteners in the orifices formed into the base. This may be advantages for hulls having a non-traditional shape.

Rub rail 10c of FIGURE 6C is quite similar to rub rail 10b, except that base 12c includes orifices 22a for fasteners, and base 12c provides somewhat more support for peripheral edges 58 of insert 14c than is provided by base 12b of FIGURE 6B.

Referring now to rub rail 10d of FIGURE 6D, an insert 14d does not extend beyond the upper opening of channel 38d, such that seams 60 are formed into the upper surface of rub rail 10d. Orifices 22d of base 12d have an enlarged upper portion 62 to enable fasteners to fit flush with base 12d.

Although the present invention has been described in connection with the preferred form of practicing it, those of ordinary skill in the art will understand that many modifications can be made thereto within the scope of the claims that follow. Accordingly, it is not intended that the scope of the invention in any way be limited by the above description, but instead be determined entirely by reference to the claims that follow.